Reclamation Research Unit

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Date: April 23, 2004

To: Sue Sillick

From: Stuart Jennings

Re: Progress Report 3. *Evaluation of Organic Matter Addition and Incorporation on Steep Cut slopes, Phase II: Test Plot Construction and Performance Monitoring*

The third progress report of Phase II of the above referenced project is attached. The attached narrative reports the results of soil analysis collected from the Happys Inn research site. Soils were collected during the fourth quarter of 2003 and submitted for laboratory analysis. Additional effort was expended to plan implementation of test plots at a research site near Miles City on clay-rich parent material.

Quarterly Progress Report #3
For the period January 1, 2004 – March 31, 2004

EVALUATION OF ORGANIC MATTER ADDITION AND INCORPORATION ON STEEP CUT SLOPES

Phase II: Test Plot Construction and Performance Monitoring

Prepared For:

Montana Department of Transportation
P.O. Box 201001
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Prepared By:

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April 2004

Task Analysis and Discussion

No activity occurred during the quarter on the project tasks: A (Literature Review), D (Equipment Identification), E (MDT Coordination Meeting), F (Preconstruction Meeting), H (Plot Construction), or J, K and L (Monitoring). As of the end of this quarter Tasks A, B, C, D, E, F and G are 100% complete.

Task B Site Selection

After several attempts to gain permission to construct research plots in conjunction with the Colstrip South construction project, a final decision was reached. The Colstrip South project would not be available for research. An alternate site was required. Phil Johnson (MDT) located a suitable site on U.S. Highway 12 near Miles City. Concurrence of the suitability of this site was provided by John Goering (MSU Reclamation Research Unit). This task is now 100% complete.

Task C Experimental Design

Selection of the Miles City research site, described in Task B, did not require modification of the experimental design developed during 2003. Identical treatments will be implemented at Miles City as constructed during 2003 in northwest Montana. One small modification was made to the experiment. The plots constructed at Miles City will not extend over the entire slope length as performed previously due to the local unavailability of short slopes. The test plots will be installed from the borrow ditch and extend up a portion of the slope and protected on the upgradient side from stormwater run-on by BMPs.

Task G Construction Coordination

Notable effort was expended during the current quarter to identify a research site in Eastern Montana on a south-facing cut slope with shale parent material. After abandonment of the Colstrip site, an alternate research location was identified by Phil Johnson (MDT) near Miles City. This site was subsequently visited by John Goering (MSU Reclamation Research Unit) to delineate and characterize the precise location of the plots. Coincidental with site selection, effort was expended to identify contractors and equipment available to implement plots at this locaiton. It is expected that MDT will need to approve supplemental funding for construction of these plots since plot construction at this site is outside the scope of the Phase II proposal. Details will be provided in the second quarterly report for 2004.

Task I Site Sampling

Samples collected from the Happys Inn research sites during the fourth quarter of 2003 were submitted for laboratory analysis. Results from the analytical laboratory were received during the current quarter and compiled into tables A1 through A4. The analytical results are attached to this progress report.

Task J Year 1 Monitoring

This task has not been initiated.

Task K Year 2 Monitoring

This task has not been initiated.

Task L Year 3 Monitoring

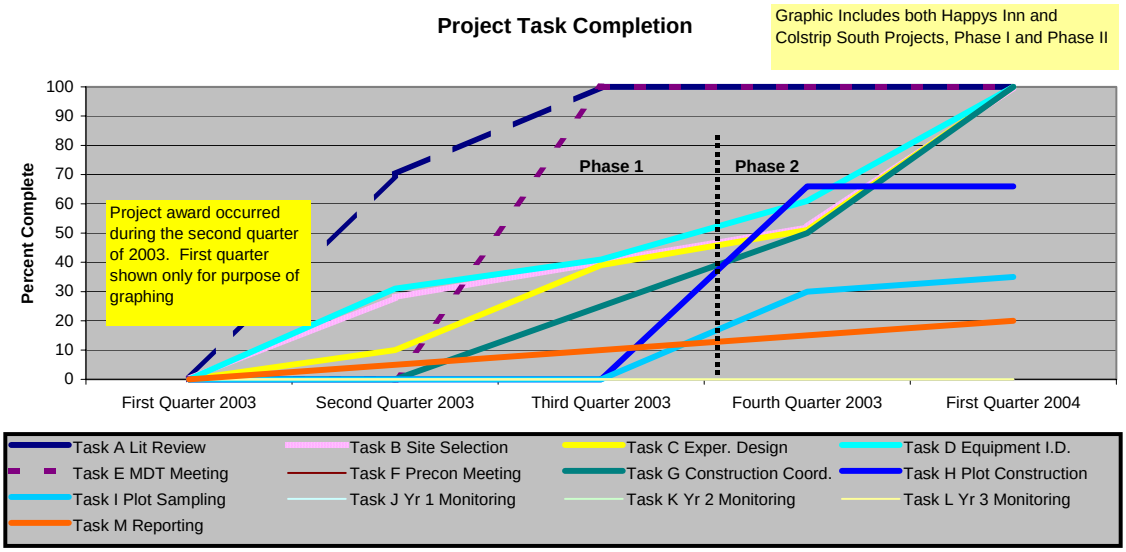
This task has not been initiated.

Task M Reporting

This third quarterly report satisfies the periodic reporting requirement of the contract. A Final Report will also be completed in 2006 summarizing the research findings. This report includes a tabular summary of analytical data collected from the Happys Inn research sites during the third quarter of 2003. These data will ultimately be compiled in the final report.

Schedule and Degree of Completion—all research sites

Task Description (Happys Inn)	*Budgeted Total Phase II*	*Proposed Schedule*	*Actual Schedule*	*Degree of Completion*	*Estimated Expenditure during current quarter*
Task B Site Reconnaissance	$678	Q3, 2003	Q3 2003, and Q1 2004	100%	$678
Task C Experimental Design	$407	Q4, 2003	Q4 2003, and Q1 2004	100%	$200
Task G Construction Schedule Coordination	$377	Q3, 2003	Q1, 2004	100%	$200
Task H Plot Construction	$36,087	Q4, 2003	Q4, 2003	100%	0
Task I Site Sampling	$8761	Q4, 2003 and Q3 2005	Q4, 2003; Analytical results Q1 2004	35%	$2500
Task J Year 1 Monitoring	$13,083	Spring and Fall, 2004	NA	0%	0
Task K Year 2 Monitoring	$15,912	Spring and Fall, 2005	NA	0%	0
Task L Year 3 Monitoring	$16,065	Spring and Fall, 2006	NA	0%	0
Task M Reporting	$16,380	Quarterly and Final Report, Fall 2006	ongoing	20%	$1000



Problems and Resolution

Selection of a field site in Eastern Montana characteristic of cut-slopes with clay-rich parent material was not possible during 2003. The original plan was to construct a site as part of an active roadway construction project. A candidate site was identified in 2003 near Colstrip, Montana. During the first quarter of 2004 the Colstrip site was rejected from further consideration due to financial and administrative considerations.

Resolution of the problem was accomplished by selection of a research site on a poorly vegetated, clay-dominated parent material slope near Miles City. Phil Johnson traveled to the site in mid-March to identify an appropriate research plot location. John Goering (MSU Reclamation Research Unit) traveled to the site to measure slope steepness and identify an appropriate plot size. The research site selection problem is considered resolved.

Accomplishments

- Analytical data representing the pre-treatment soil conditions observed at the Happys Inn research site were compiled and are attached to this progress report. The data presented confirmed prior assumptions related to the expected harsh physical and chemical conditions with one exception. The silt-dominated site located at milepost 77 near Middle Thompson Lake exhibited chemically unfavorable characteristics. Notably elevated levels of sodium, with sodium adsorption ratios up to 24.5, were reported by the laboratory (Table A2).

- Planning for construction of test plots near Miles City was initiated and included multiple communications with MDT personnel and prospective contractors and equipment providers. A site selection field trip was performed on March 31.

Fiscal Expenditure

Amount Spent by budget category:

Cost Category	***Spent Prior to current quarter (Revised April 2004)* ($)***	***Spent during the current quarter ($)***	***Total Spent ($)***
Labor and Benefits	$10,168.20 *$13,032.35*	$3345.84	$16,378.19
Operational Expenses	$1306.84 *$3569.45*	$12.44	$3581.89
Subcontracted Services	$9777.11 *$7542.00*	$495.00	$8037.00
Indirect Charges	$2994.34 *$4828.08*	$770.66	$5598.74
Total Spent	***$24,246.49*** ***$28,971.88***	***$4623.94***	***$33,595.82***

* Revised amounts are based on expenses (principally salaries and benefits) incurred during a quarter of the year, but not clearing or being posted until the following quarter. Additionally, the invoice for purchase of compost ($2243) was previously posted in the Subcontracted Service category and has been moved to the Operational Expenses category.

Total Project Award $108,975 (*subject to modification during the second quarter of 2004 to provide for implementation of the test plots at Miles City*)

Amount Remaining $75,379.18

Progress Report
Attachments

Appendix Table A1. Chemical characteristics of compost used in Happys Inn research plots, U.S. Highway 2.

Sample I.D.	pH	EC (dS/m)	Total C%	Total N%	% H_2O	TKN % N	Organic Matter %
EKO compost	6.8	1.01	28.0	1.25	31.7	0.82	36.9

Appendix Table A2. Chemical characteristics of soil substrates prior to construction of research Plots near Happys Inn, U.S. Highway 2.

Sample I.D.	Mg mg/L	Na mg/L	Ca mg/L	EC (dS/m)	pH	SAR
MP 77 Plot 1	11	209	8	1.00	8.7	11.1
MP 77 Plot 2	13	455	5	1.97	8.6	24.5
MP 77 Plot 3	38	251	58	1.56	8.2	6.3
MP 77 Plot 4	58	391	26	2.09	8.3	9.8
MP 77 Plot 5	48	163	14	1.16	8.4	4.6
MP 69 Plot 6	8	6	54	0.40	8.1	0.2
MP 69 Plot 7	16	8	83	0.58	8.0	0.2
MP 69 Plot 8	16	6	110	0.65	8.4	0.2
MP 69 Plot 9	13	5	93	0.56	8.5	0.1
MP 69 Plot 10	20	6	79	0.54	8.5	0.2
MP 69 Plot 10 Duplicate	19	6	72	0.55	8.5	0.2

Appendix Table A3. Nutrient levels in soil substrates prior to construction of research plots near Happys Inn, U.S. Highway 2.

Sample I.D.	NO_3-N mg/kg	P mg/kg	K mg/kg
MP 77 Plot 1	0.5	3.3	66
MP 77 Plot 2	2.1	2.2	62
MP 77 Plot 3	1.0	5.0	60
MP 77 Plot 4	0.4	1.4	68
MP 77 Plot 5	0.3	1.7	50
MP 69 Plot 6	4.3	6.1	48
MP 69 Plot 7	5.9	8.6	52
MP 69 Plot 8	7.3	20.3	134
MP 69 Plot 9	2.7	6.1	68
MP 69 Plot 10	3.1	7.5	46
MP 69 Plot 10 Duplicate	3.1	6.8	52

Appendix Table A4. Physical characteristics of soil substrates prior to construction of research plots Near Happys Inn, U.S. Highway 2.

Sample I.D.	Sand %	Silt %	Clay %	Saturation Percentage (% H_2O)	Texture
MP 77 Plot 1	2	78	20	39.1	Silt loam
MP 77 Plot 2	< 1	84	16	37.9	Silt loam
MP 77 Plot 3	4	86	10	38.3	Silt
MP 77 Plot 4	2	84	14	40.7	Silt loam
MP 77 Plot 5	2	86	12	39.0	Silt loam/Silt
MP 69 Plot 6	66	26	8	17.9	Sandy loam
MP 69 Plot 7	68	26	6	18.4	Sandy loam
MP 69 Plot 8	56	34	10	31.6	Sandy loam
MP 69 Plot 9	80	16	4	19.9	Loamy sand
MP 69 Plot 10	70	24	6	20.1	Sandy loam
MP 69 Plot 10 Duplicate	69	27	4	19.4	Sandy loam